Clustering Report Summary

1. **Customer Segmentation**:
   Customers were grouped into clusters based on their signup time and region. Three key segments were identified: new customers, loyal customers, and region-specific customers.

2. **Product Clustering**:
   Products were divided into clusters based on their reviews and ratings. The clusters revealed high-performing products, moderately-rated ones, and poorly-rated products that need attention.

3. **Optimal Number of Clusters**:
   The optimal number of clusters was determined using the Davies-Bouldin Index, ensuring clear and distinct groupings for both customers and products.

4. **Visualizations**:
   PCA plots confirmed the effectiveness of clustering, showing well-separated customer and product groups, which makes the analysis actionable.

5. **Recommendations**:

   Target new customers with welcome offers and loyal customers with retention strategies.

   Promote high-rated products and focus on improving poorly-rated ones.

   Run regional campaigns for areas with lower activity to boost sales.